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IE 530

CALIBRATION PROCEDURE FOR RADIO TEST SET AN/ARM-5 and AN/ARM-5A

Headquarters, Department of the Army, Washington, DC
25 January 1985

REPORTING OF ERRORS

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*This bulletin supersedes TB 9-6625-955-35, 10 October 1980, including all changes.

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SECTION I

IDENTIFICATION AND DESCRIPTION

1. Test Instrument Identification. This bulletin provides instructions for the calibration of Radio Test Set AN/ARM-5 and AN/ARM-5A. TM's 11-518, 11-518A, 11-518B, 11-6625-828-12, and 11-6625-828-45 were used as the prime data sources in compiling these instructions. The equipment being calibrated will be referred to as the TI (test instrument) throughout this bulletin.

a. Model Variations. Variations among models are described in text.

b. Time and Technique. The time required for this calibration is approximately 2 hours, using the dc and low frequency technique.

2. DA Form 2416 (Calibration Data Card)

a. Forms, records, and reports required for calibration personnel at all levels are prescribed by TB 750-25-1. DA Form 2416 must be annotated in accordance with TB 750-25-1 for each calibration performed.

b. Adjustments to be reported on DA Form 2416 are designated (R) at the end of the sentence in which they appear. When adjustments are in tables, the (R) follows the designated adjustment. Report only those adjustments made and designated with (R).

3. Calibration Description. TI parameters and performance specifications which pertain to this calibration are listed in table 1.

Table 1. Calibration Description

Test instrument parameters	Performance specifications
Power input requirements[1]	115 V ac, 60 Hz ±0.2 Hz, 160 W
Frequency	Range: 108 to 132 MHz; two preselected fixed frequencies within this range controlled by type CR23/U plug-in crystal, normally supplied for output frequency of 110.9 and 114.9 MHz Accuracy: ±0.005% from -40° to +50°C
Omni track angle	±0.5° at room temperature ±1° from -40° to +50°C
RF output	±2 dB
Modulation	2%

[1]Input frequency (60 Hz) is critical and must be accurate within 0.2 Hz. Input frequency determines the 30 Hz frequency generated by internal motor driven tone wheel.

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SECTION II

EQUIPMENT REQUIREMENTS

4. Equipment Required. Table 2 identifies the specific equipment to be used in this calibration procedure. This equipment is issued with Secondary Transfer Calibration Standards Set AN/GSM-287. Alternate items may be used by the calibrating activity when the equipment listed in table 2 is not available. The items selected must be verified to perform satisfactorily prior to use and must bear evidence of current calibration. The equipment must meet or exceed the minimum use specifications listed in table 2. The accuracies listed in table 2 provide a four-to-one ratio between the standard and TI. Where the four-to-one ratio cannot be met, the actual accuracy of the equipment selected is shown in parenthesis.

5. Accessories Required. The accessories listed in table 3 are issued as indicated in paragraph 4 above and are used in this calibration procedure. When necessary, these items may be substituted by equivalent items, unless specifically prohibited.

Table 2. Minimum Specifications of Equipment Required

Item	Common name	Minimum use specifications	Manufacturer and model (part number)
A1	ATTENUATOR	Range: 10 dB	Hewlett-Packard, Model 355C (7910807)
A2	AUTOTRANSFORMER	Range: 105 to 125 V ac Accuracy: ±3%	General Radio, Model W10MT3AS3 or Ridge, Model 9020F (7910809)
A3	DIGITAL VOLTMETER	Range: 0.776 to 1.3 V rms, 70 to 85 V dc Accuracy: ±0.1%	Hewlett-Packard, Model 3490AOPT060 (3490AOPT060)
A4	FREQUENCY COUNTER	Range: 90 Hz to 115 MHz Accuracy: ±0.0016%	Hewlett-Packard, Model 5345A (MIS-28754/1 Type 1) w/5355A and K87-59992A
A5	MODULATION ANALYZER	Modulation: 30 Hz at 30% Accuracy: ±0.05%	Hewlett-Packard, Model 8901 (8901)
A6	POWER METER	Range: 2 μW to 3.17 mW (-29 to +6 dBm) Accuracy: +0.66 dB	Hewlett-Packard, Model E12-432A (MIS-30525) w/ thermistor mount, Hewlett-Packard, Model 478A (9975991) or 8478A
A7	RESISTANCE STANDARD	Range: 1Ω to 100 kΩ	Biddle-Gray, Model 71-631 (71-631)
A8	WAVE ANALYZER[1]	Range: 90 to 150 Hz, 0.776 to 1.3 V rms	Hewlett-Packard, Model 302AR (302AR)
A9	ZIFOR[1]	Range: Null indication at 180° Accuracy: ±0.125° (1°)	Collins, Model 478A3 (478A3)

[1]Limited deployment.

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Table 3. Accessories Required

Item	Common name	Description (part number)
B1	ADAPTER	BNC T-type, 2 jacks, 1 plug (MS35173-274C)
B2	ADAPTER	BNC plug to double banana jack (7909401)
B3	ADAPTER	BNC jack to N plug (10519457)
B4	ADAPTER	Single banana jack to alligator clip (red) (7907556-1)
B5	ADAPTER	Single banana jack to alligator clip (black) (7907556-2)
B6	CABLE[1]	30-in., RG-58/U; BNC plug terminations (7907467)
B7	CABLE[1]	30-in., RG-58/U; BNC plug to double banana plug terminations (7907471)
B8	CONNECTOR	N jack to N jack (10519455)
B9	LEAD	24-in., No. 18; single banana plug terminations (red) (7907497)
B10	LEAD	24-in., No. 18; single banana plug terminations (black) (7907498)

[1]Two required.

SECTION III

CALIBRATION PROCESS

6. Preliminary Instructions

a. The instructions outlined in paragraphs 6 and 7 are preparatory to the calibration process. Personnel should become familiar with the entire bulletin before beginning the calibration.

b. Items of equipment used in this procedure are referenced within the text by common name and item identification number as listed in tables 2 and 3. For the identification of equipment referenced by item numbers prefixed with A, see table 2, and for prefix B, see table 3.

WARNING

HIGH VOLTAGE is used or exposed during the performance of this calibration. DEATH ON CONTACT may result if personnel fail to observe safety precautions.

NOTE

Unless otherwise specified, verify the result of each test and, whenever the test requirement is not met, take corrective action before continuing with the calibration. Adjustments required to calibrate the TI are included in this procedure. Additional maintenance information is contained in the TM's 11-518, 11-518A, 11-518B, 11-6625-828-12, and 11-6625-828-45.

NOTE

Unless otherwise specified, all controls and control settings refer to the TI.

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7. Equipment Setup

NOTE

Remove TI protective cover only to perform adjustments. Reinstall immediately after adjustments.

a. Connect TI to autotransformer (A2).

b. Connect autotransformer to a 115-V ac, 60-Hz power source, and adjust for a 115-V ac output.

c. Position controls as listed in (1) through (5) below:

NOTE

Control settings listed in parenthesis pertain to AN/ARM-5A.

(1) STAND BY-OPERATE (POWER-STAND BY) switch to STAND BY.

(2) For AN/ARM-5 only, POWER-OFF switch to POWER.

(3) MC switch to B.

(4) Function (MODULATION) switch to RF (OMNI).

(5) All modulation controls fully ccw.

d. Allow 30 minutes for TI to warm up and stabilize.

e. Set STAND BY-OPERATE (POWER-STAND BY) switch to OPERATE (POWER).

f. Set identifier off/on switch to off.

8. RF Output

a. Performance Check

(1) Connect power meter (A6) to TI RF OUTPUT 1 VOLT, using attenuator (A1) (set to 10 dB), connector, adapter, and cable (B8, B3, and B6).

(2) Adjust RF meter ZERO SET control for ZERO SET indication on TI RF meter.

(3) Adjust RF LEVEL (RF LEVEL SET) control for LEVEL SET indication on TI RF meter. If power meter does not indicate between 1.26 and 3.17 mW, perform b(1) through (5) below.

(4) Set MC switch to A.

(5) Repeat (3) above. If power meter does not indicate between 1.26 and 3.17 mW, perform b(6) and (7) below.

b. Adjustments

(1) Adjust B adjustment controls (front panel) alternately for maximum indication on power meter.

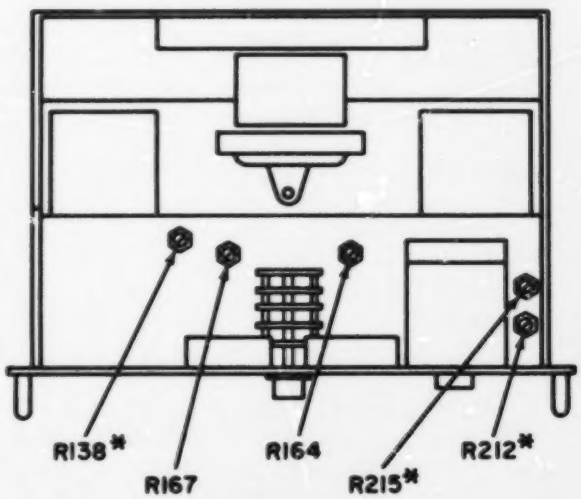
(2) Adjust RF LEVEL (RF LEVEL SET) control for a 2-mW indication on power meter.

(3) Adjust RF meter ZERO SET control for ZERO SET indication on TI RF METER.

NOTE

For AN/ARM-5, perform (4), (6), and (7) below. For AN/ARM-5A, perform (5), (6), and (8) below.

(4) Adjust R164 (fig. 1) for LEVEL SET indication on TI RF meter (R).



* MODEL AN/ARM-5A ONLY

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Figure 1. Test instrument - top interior view.

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(5) Adjust R212 (fig. 1) for LEVEL SET indication on TI RF meter (R).

(6) Adjust A adjustment controls (front panel) alternately for maximum indication on power meter.

(7) Readjust R164, if necessary, for an in-tolerance indication for both A and B MC switch settings.

(8) Readjust R212, if necessary, for an in-tolerance indication for both A and B MC switch settings.

9. RF Attenuator

a. Performance Check

(1) Remove attenuator and one cable from equipment setup and connect adapter (B3) to cable (B6).

NOTE
Terminate TI RF OUTPUT 1 VOLT jack, using 50-ohm termination supplied with TI.

(2) Set MC switch to A and adjust RF LEVEL (RF LEVEL SET) control for LEVEL SET indication on TI RF meter.

(3) Adjust OUTPUT ATTENUATOR (ATTENUATOR) control to 10 KuV. Power meter will indicate between -25 and -29 dBm (decibel referenced to 1 mW).

b. Adjustments. No adjustments can be made.

10. RF Output Frequency

a. Performance Check

(1) Remove crystal cover (A CRYSTAL B) cap beneath MC switch and assure frequencies of installed crystals are as marked on MC switch panel markers.

(2) Adjust RF meter ZERO SET control for ZERO SET indication on TI RF meter.

(3) Connect frequency counter (A4) input to TI RF OUTPUT 1 VOLT, using cable (B6), and 50-ohm termination supplied with TI. Frequency counter will indicate between 110.895 and 110.905 MHz.

(4) Set MC switch to B. Frequency counter will indicate between 114.895 and 114.905 MHz.

b. Adjustments. No adjustments can be made.

11. Modulation

a. Performance Check

(1) Connect equipment as shown in figure 2.

(2) Set function (MODULATION) switch to 30~MOD (30~).

(3) Adjust RF LEVEL (RF LEVEL SET) control for LEVEL SET indication on TI RF meter.

(4) Adjust MOD(%) meter ZERO SET (green delta) indication on TI MOD (%M) meter. If frequency counter (A4) and modulation analyzer (A5) does not indicate a 30-Hz signal with 30 percent modulation, perform **b** below.

b. Adjustments

NOTE
For AN/ARM-5, perform (1) and (2) below. For AN/ARM-5A, perform (1) and (3) below.

(1) Adjust 30~MOD control for 30 percent modulation reading on modulation analyzer.

(2) Adjust R167 (fig. 1) for LEVEL SET indication on TI MOD meter (R).

(3) Adjust R215 (fig. 1) for green delta indication on TI % meter (R).

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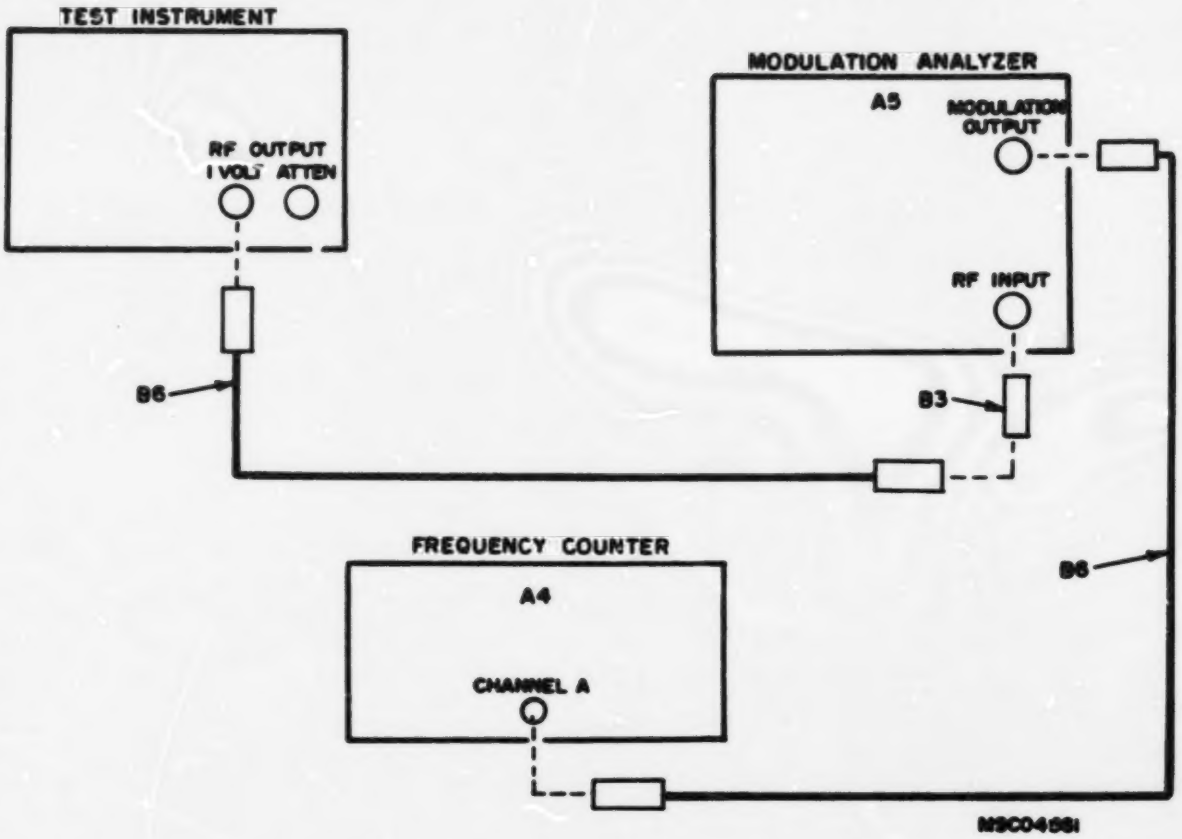

Figure 2. Modulation - equipment setup.

12. Omni Tracking

a. Performance Check

(1) Connect modulation analyzer (A5) to RF OUTPUT 1 VOLT connector, using adapter and cable (B3 and B6).

(2) Position controls as listed in (a) through (g) below:

(a) Function (MODULATION) switch to 30∼MOD (30∼).

(b) 30∼MOD control for LEVEL SET (green delta) indication on TI MOD (%M) meter.

(c) Function (MODULATION) switch to 9960∼MOD (9960∼).

(d) 9960∼MOD control for LEVEL SET (green delta) indication on TI MOD (%M) meter.

(e) RF LEVEL (RF LEVEL SET) control for LEVEL SET indication on TI RF meter.

(f) Function (MODULATION) switch to OMNI.

(g) ONMI TRACK switch to 180.

(3) Connect zifor (A9) to modulation output on modulation analyzer (A5), using cable (B6). If zifor does not indicate between 359.50 and 000.50, perform b below.

(4) Wait 1 hour. After 1 hour, zifor will indicate between 359.50 and 000.50.

b. Adjustments

(1) Adjust R138 (fig. 1) for 000.00 indication on zifor (R).

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NOTE

If R138 is a fixed resistor as shown in figure 3, perform (2) through (4) below.

(2) Remove R138 from circuit and insert resistance standard (A7), using adapters and leads (B4, B5, B9, and B10).

(3) Adjust resistance standard for a null indication on zifor. Record indicated resistance value of resistance standard.

(4) Disconnect resistance standard and install a resistor of the same resistance value as recorded in (3) above. Zifor will indicate a null (R).

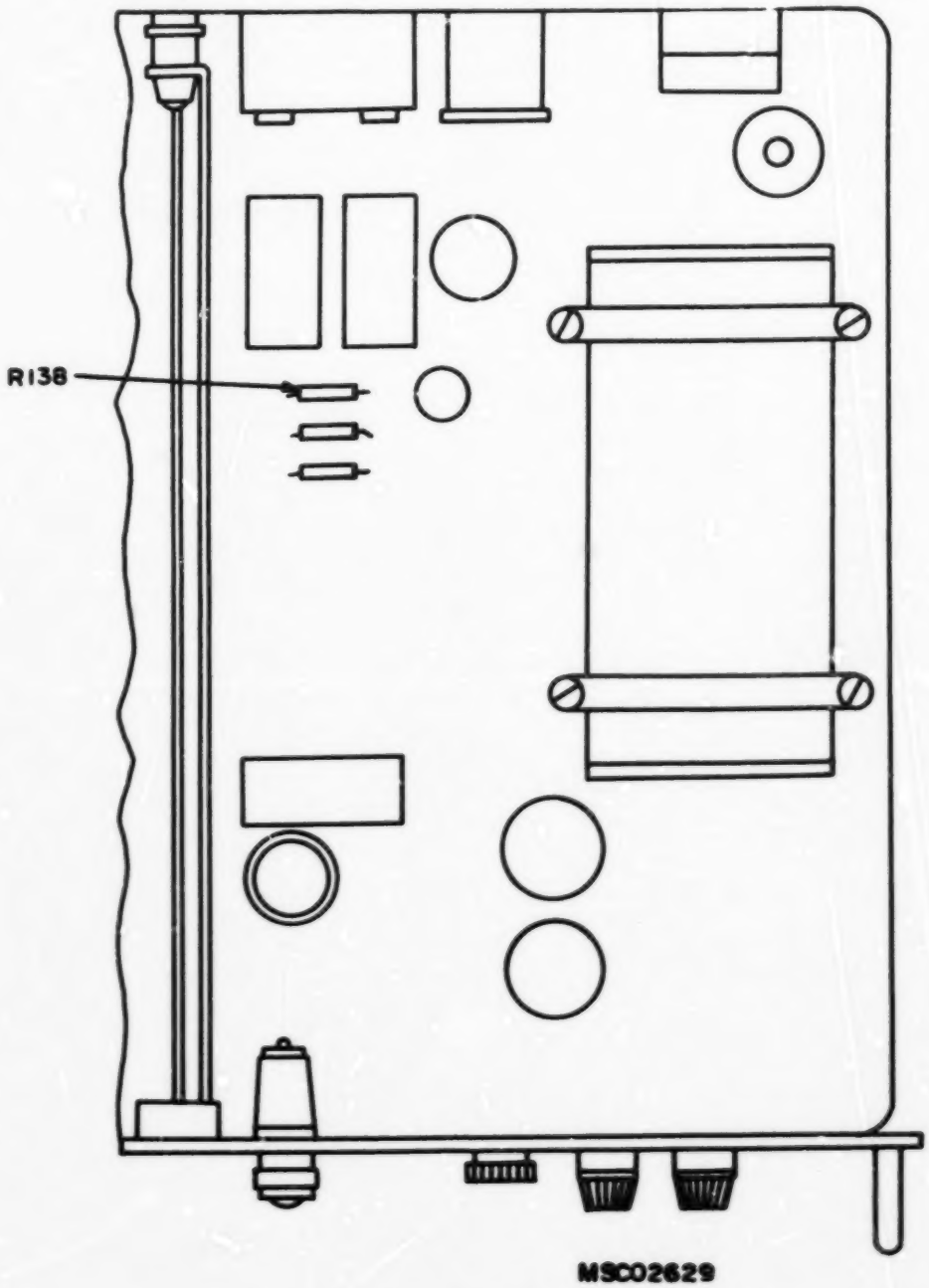

Figure 3. Test instrument - bottom interior view.

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13. Amplitude Localizer Function

a. Performance Check

(1) Connect equipment as shown in figure 4.

(2) Position controls as listed in (a) through (j) below:

(a) MODULATION switch to OMNI.

(b) All modulation controls fully ccw.

(c) MC switch to A.

(d) RF LEVEL SET control for LEVEL SET indication on TI RF meter.

(e) MODULATION switch to 90 ∼.

(f) 90 ∼ MOD control for red line indication on TI %M meter.

(g) MODULATION switch to 150 ∼.

(h) 150 ∼ MOD control for red line indication on TI %M meter.

(i) Perform (e) through (h) above if interaction is detected between the 90 ∼ MOD and 150 ∼ MOD.

(j) MODULATION switch to AMP LOC center.

(4) Adjust wave analyzer (A8) frequency control for a 90-Hz indication on frequency counter (A4) and output control for a 1-V rms indication on digital voltmeter (A3).

(5) Adjust wave analyzer frequency control for a 150-Hz indication on frequency counter. If digital voltmeter does not indicate between 0.977 and 1.023 V rms, perform b(1) below.

(6) Repeat (4) above.

(7) Set function (MODULATION) switch to AMP LOC left. If digital voltmeter does not indicate between 0.7897 and 0.8151 V rms, perform b(2) and (3) below.

(8) Set function (MODULATION) switch to AMP LOC right. If digital voltmeter does not indicate between 1.237 and 1.281 V rms, perform b(2) and (3) below.

(9) Set function (MODULATION) switch to AMP LOC center.

(10) Adjust wave analyzer frequency control for a 150-Hz indication on frequency counter and output for a 1-V rms indication on digital voltmeter.

(11) Set function (MODULATION) switch to AMP LOC left. If digital voltmeter does not indicate between 1.237 and 1.281 V rms, perform b(2) and (3) below.

(12) Set function (MODULATION) switch to AMP LOC right. If digital voltmeter does not indicate between 0.7897 and 0.8151 V rms, perform b(2) and (3) below.

b. Adjustments

NOTE

Adjustments below may not be included on all models. If included, adjustments are located on bottom of TI chassis.

(1) Repeat a(4) and (5) above while adjusting R205 for 90 Hz and R136 for 150 Hz, and equal amplitude indication on digital voltmeter for both frequencies (R).

NOTE

TI MOD (%M) meter will indicate LEVEL SET when R136 and R205 are adjusted properly.

(2) Set function (MODULATION) switch from AMP LOC left to AMP LOC right while adjusting R101 (R148) for digital voltmeter indications in a(7) and (8) above (R).

(3) Repeat (2) above with wave analyzer frequency adjusted to 150 Hz, except adjust R125 (R146) for digital voltmeter indications in a(11) and (12) above (R).

NOTE

Above adjustments interact; therefore, repeat until no further adjustment is necessary.

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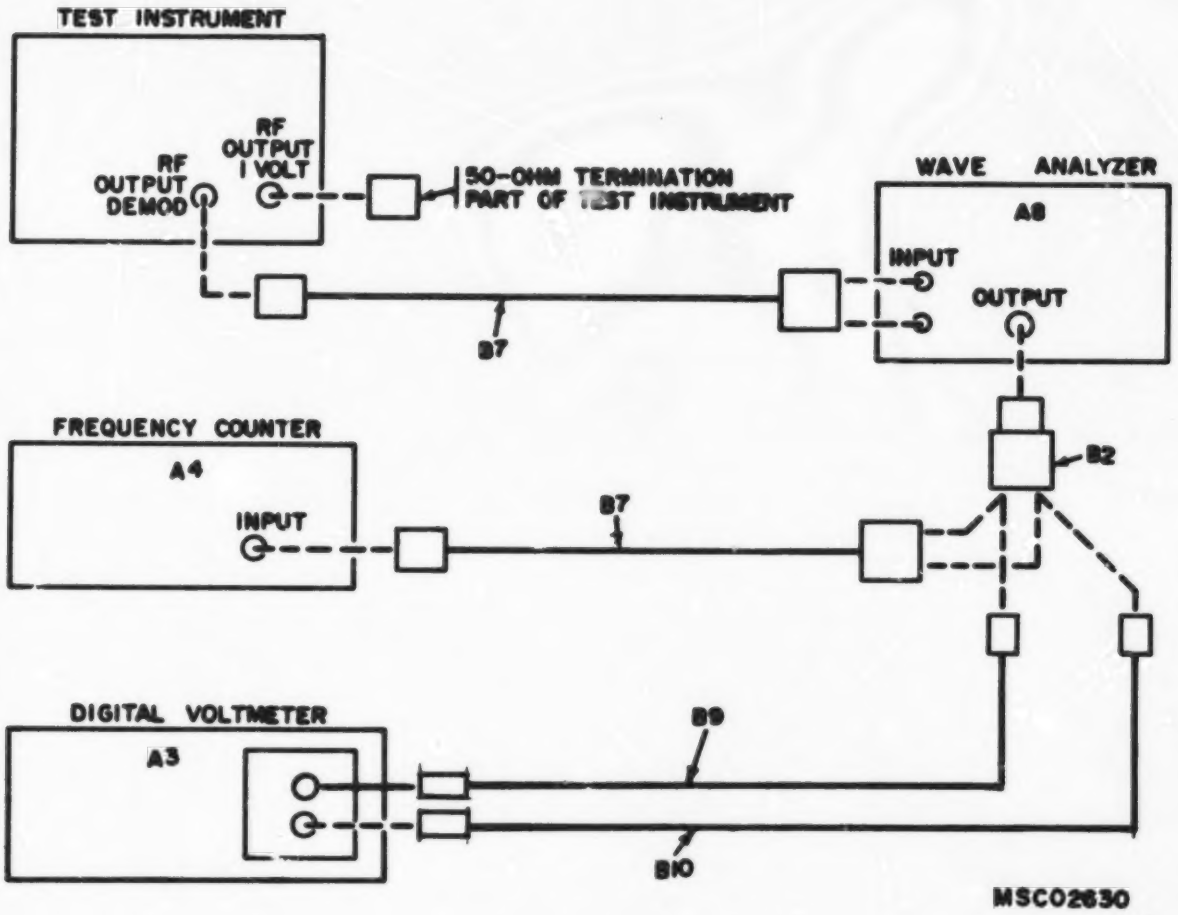

Figure 4. Amplitude localizer - equipment setup.

14. Final Procedure

a. Deenergize and disconnect all equipment and reinstall protective cover on TI.

b. When all parameters are within tolerance, annotate and affix DA Label 80 (US Army Calibrated Instrument). When the TI receives limited or special calibration, annotate and affix DA Label 163 (US Army Limited or Special Calibration). When the TI cannot be adjusted within tolerance, repair the TI in accordance with the maintenance manual. When repair is delayed for any reason or the TI cannot be repaired with local resources, annotate and affix DA Form 2417 (US Army Calibration System Rejected Instrument) and inform the owner/user accordingly in accordance with TB 750-25-1.

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